Individual-Level Predictors of Climate Misinformation Susceptibility

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Abstract: *Misinformation poses a substantial challenge for consensus on critical issues like climate change. While research has identified numerous psychological drivers of misinformation susceptibility, the interplay between belief systems, knowledge, and deliberation may benefit from further investigations. This study (N = 675) investigates these factors to better understand individual differences in judging and sharing climate-related information. Participants reported their manipulation judgement, sharing intentions, and analytic thinking for posts that contained manipulation strategies (ad hominem attacks, false dichotomies, cherry-picking data, setting impossible expectations, pseudo-experts) and credible control posts. Participants also reported predictors including political opinion, conspiracy thinking, climate knowledge, and persuasion knowledge (i.e. awareness of persuasive attempts). Using Bayesian regression models, we found that, while our participants were generally better at identifying manipulative than credible content, a more progressive political opinion, higher formal education, higher climate knowledge, and higher persuasion knowledge were associated with better sharing decisions, better manipulation judgements, and more analytic thinking.*

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Findings on the Big Five personality traits were mixed with less agreeable participants making better sharing decisions and less conscientious participants engaging more in analytic thought. While we found that longer deliberation times were connected to more analytic thinking, they were not credibly associated with manipulation judgments and even slightly worse average sharing decisions. These findings support the idea that for polarized topics such as climate change, belief may be at least as important as objective knowledge. Interventions should address the complex interplay between identity, beliefs, knowledge, and deliberation.

1. Introduction

The Internet is a rich repository of curious, harmless, and valuable content, but it is also home to malicious actors propagating falsehoods to manipulate unsuspecting recipients (Kbaier et al., 2024). Misinformation can often outpace countermeasures, such as fact-checking, which take time to produce and distribute (Roozenbeek et al., 2022). Misconceptions derived from misinformation range from harmless inaccuracies to drivers of notable problems, including undesirable behaviors, increased polarization, and distrust in science and credible institutions (Cook et al., 2023; Van Bavel et al., 2024). Misinformation therefore poses a substantial societal challenge that necessitates a multidisciplinary response to mitigate its impact (Kozyreva et al., 2024).

Climate change misinformation presents a peculiar case: Climate change is a complex, high-stakes scientific issue that has been targeted by organized, well-funded disinformation campaigns for decades (Herasimenka et al., 2025). However, most citizens do no longer believe outright climate denial (Leiserowitz et al., 2025). Disinformation campaigns have therefore moved from denial to delay, strategically exploiting the inherent uncertainties of scientific modeling and public discourse to sow doubt, confuse the public, and ultimately delay or prevent policy action (Lamb et al., 2020). Exposure to misleading information, such as cherry-picked statistics, can lower public support for climate mitigation policies (Cook, 2022).

Belief in climate misinformation is not an isolated fallacy but often entrenched in a broader belief system (Ziegler, 2017). Therefore, this cross-sectional study aims to investigate the individual drivers of belief in climate change misinformation. We focus on conspiracy beliefs (Uscinski et al., 2017), climate knowledge (Visschers, 2018), skepticism towards persuasive attempts (Fendt, Scheibenzuber, et al., 2025), and analytic thinking (Pennycook & Rand,

2019). Furthermore, we explore the ongoing debate over whether judging falsehoods and detecting credible information are two distinct processes (Kiili et al., 2023) or one overarching process (Pennycook et al., 2024).

2. Theoretical Framework

Misinformation refers to any false or inaccurate information, including errors, misunderstandings, or unverified content, that people may create and share (Ecker et al., 2022). Unlike disinformation, which is deliberately deceptive, misinformation can arise innocently or unintentionally. While some types of misinformation arguably cause little harm, such as hoaxes by satirical outlets, disinformation can have devastating impact on societies (Abudu et al., 2023). Although the content examined in this study largely qualifies as disinformation, we use the broader term "misinformation" because it is often difficult to undoubtedly prove a spreader's intent to deceive.

While high-quality information often requires time for thorough quality control and states the limitations of current knowledge, misinformation often presents holistic solutions quickly (Ecker et al., 2022). Consequently, misinformation can spread quickly in situations of uncertainty, where countermeasures and high-quality information have yet to be implemented (Van Der Linden, 2022). Since it is impossible to reach the entire audience of initial misinformation with debunking, research has also focused on measures to prevent and slow the spread of misinformation by reducing the intention to share (Roozenbeek et al., 2022). While spreading misinformation can have monetary benefits, ideological motives, like sowing social discord, are arguably a larger threat to society (Bakir & McStay, 2018; Lazer et al., 2018).

Misinformation can be found about the same topics as credible information, including but not limited to health, politics, nutrition, and climate change (Ecker et al., 2022). If people are exposed to misinformation, they may develop false beliefs that range from simple misconceptions to the outright rejection of factual evidence. Climate change misinformation is a well-researched example where disinformation campaigns have increased polarization and opposition to climate change policies (Lamb et al., 2020; Ziegler, 2017). While research argues that belief in misinformation does not necessitate undesirable actions, there have been numerous incidents where misinformation has sparked resistance to renewable energy projects like wind turbines (Winter et al., 2022).

Beyond defining misinformation, a central challenge in its study is how to conceptualize and measure an individual's susceptibility to it.

Research has debated whether *discriminating information quality* should be conceptualized as an overarching ability (e.g. Roozenbeek et al., 2022), two distinct processes (e.g. Fendt et al., 2023), or something else (Tay et al., 2024). An overarching credibility discernment score that indicates a tendency to trust credible information and distrust dubious information is compelling and arguably easy to interpret—a higher score indicates greater tendency for a person to believe credible information over misinformation (Pennycook et al., 2024). However, discernment can also yield ambiguous results, because people who distrust all information would still receive a medium score, since they do not favor unreliable over credible information. Furthermore, discernment does not indicate whether people trust information too easily. Meta-analytic evidence by Sultan et al. (2024) illustrates this limitation: discernment ability appears to increase with age which originates from a lower level of trust in all information that is more pronounced for dubious than credible information. Conversely, more educated people seem to trust credible information disproportionately more than misinformation. And lastly, discernment, often scored by equally weighing credible and dubious information, may not resemble people's information diet that mainly leans towards credible information (Altay et al., 2023; Kbaier et al., 2024).

Separate scores on credible information and misinformation may be harder to interpret but come closer to recent findings that detecting credible and dubious information may be two separate processes (Fendt et al., 2023; Fendt, Scheibenzuber, et al., 2025; Kiili et al., 2023). However, dichotomously categorizing information may still not capture the nuances of real-world misinformation that often uses ambiguous language, greyscales, and logical fallacies instead of presenting outright falsehoods (Lazer et al., 2018; Tay et al., 2024). Apart from the theoretical lens through which belief in misinformation can be measured, individual characteristics are essential for identifying predictors of misinformation susceptibility.

Decades of research (e.g. Ecker et al., 2022; Sultan et al., 2024) have identified numerous factors, which we group into cognitive abilities, belief systems, and stable personal traits. Perhaps the most studied factors relate to how people think, including their tendency for analytical thought and their existing knowledge. Higher *analytic skills* are robustly associated with better credibility discernment (Sultan et al., 2024). Drawing from dual-process theories of cognition, individuals tend to either follow a route of analytic, slow, and motivated

investigation or intuitive, fast, and unmotivated reception. According to this view, people often fall for misinformation because they rely on their initial, intuitive gut reactions (Bago et al., 2020; Pennycook & Rand, 2019). People mostly engage analytically with information if their intuitive flow is interrupted or if the information contradicts their beliefs or is utterly unbelievable (Schwarz et al., 2021). While intuitive assessments are fast and often reasonably accurate (Modirrousta-Galian et al., 2025), this unmotivated route can leave people prone to biases exploited by misinformation, as they rely on cognitive shortcuts based on familiarity or belief consistency (Ecker et al., 2022; Epstein et al., 2023). The analytical path requires high motivation and cognitive resources to scrutinize claims and sources (Fendt, Muth, et al., 2025; Swami et al., 2014). This can also be indicated by the *time taken to reflect* on information credibility, which can notably improve the accuracy of credibility assessments (Fazio, 2020).

In general, studies have found a relationship between higher *content knowledge* and the ability to correctly judge the credibility of information in that domain (Fendt, Scheibenzuber, et al., 2025; Flanagin et al., 2020; Lucassen et al., 2013). However, recent studies have yielded mixed findings on the protective role of knowledge on politicized topics such as climate change (Ecker et al., 2022; Edelson et al., 2024). In other words, people with higher science literacy and education may not be the most concerned about climate change (Kahan et al., 2012). Formal education may also serve as an indicator of prior knowledge, again without a credible relationship (Sultan et al., 2024). Knowledge and education may not be neutral tools, but instead serve primarily to effectively seek out, interpret, and argue for evidence that supports a person's pre-existing position on politicized topics. In some cases prior knowledge may even be counterproductive if misinformation blends novel, false claims with known, correct claims (Benegal & Scruggs, 2018).

While cognitive style explains *how* people process information, their pre-existing belief systems often determine *why* they accept or reject it, particularly for politicized topics (Benegal & Scruggs, 2018; Compton et al., 2021; Faragó et al., 2023; Fendt, Scheibenzuber, et al., 2025). One such system is a person's *persuasion knowledge*. The process of reading misinformation can be conceptualized as an episode in which a malicious actor (persuader) tries to persuade a reader (recipient) of a claim (Cuteanu, 2024). Persuasion attempts are not exclusive to misinformation, but malicious actors often employ manipulative strategies such as logical fallacies or outright falsehoods, while credible actors mostly root their attempts in facts and logic (Arce, 2024; Cook et al., 2023). Over

the course of their lives, people develop a lay theory of persuasion attempts, encompassing their tactics, goals, and agents. When people recognize such an attempt, persuasion knowledge is activated and triggers coping behaviors such as increased skepticism, critical evaluation, and counter-arguing (Eisend & Tarrahi, 2022). This is directly related to misinformation, where knowledge about the persuasive nature of malicious actors can help people remain skeptical of dubious information and resist persuasion attempts (Chen & Cheng, 2019).

Belief in *conspiracy theories* is another factor deeply intertwined with misinformation susceptibility (O'Mahony et al., 2023). Conspiracy theories offer holistic yet misleading explanations during times of uncertainty, often providing a false sense of control and closure in response to existential threats or stressful situations (Liekefett et al., 2023). They can also serve as a vehicle for social belonging by making people feel part of a knowledgeable in-group, often doubting the cognitive abilities and motives of the out-group (Bowes et al., 2023). Research has found that a conspiratorial mindset is one of the few factors that is consistently associated with general misinformation susceptibility, including both political and non-political content (Bowes et al., 2023). Their compelling nature makes conspiracy theories particularly persuasive and resistant to correction. As a result, a large fraction of the global population, including nearly half of the citizens in the United States of America, endorses at least one conspiracy theory, while few interventions can permanently reduce these beliefs (Oliver & Wood, 2014; Van Prooijen & Douglas, 2018; Walter & Drochon, 2022). As argued by Imhoff and Bertlich (2024), conspiratorial worldviews form a self-sealing belief system of epistemic distrust towards official sources (e.g. governments, science, and mainstream media) and trust in alternative, anti-establishment sources. This system is almost impossible to correct due to a deeply entrenched distrust in most correction institutions (Lewandowsky et al., 2013).

Finally, on politicized topics like climate change, an individual's *political opinion* and overarching worldview may be more influential determinants than cognitive abilities alone. For politicized information, the primary goal of information processing often shifts from determining credibility to affirming identity (Swire-Thompson et al., 2020). In general, if information is coherent with a person's political views, they are more likely to accept it as true, regardless of its actual credibility, as long as it is not utterly unbelievable (Sultan et al., 2024).

Stable characteristics such as demographics and core personality traits provide a context for an individual's susceptibility to misinformation. The influence of *demographic* variables is often more complex than popular narratives suggest. Several studies found that older people make worse overall sharing decisions but judge information credibility slightly better, mostly because of a higher skepticism towards information in general (Sultan et al., 2024). Contrary to common belief, most studies find no credible education effects, because even people involved in higher education are often susceptible to misinformation (Breakstone et al., 2021; Sultan et al., 2024). Lastly, most studies have not found a credible gender effect, even though some studies found that men may be more susceptible to climate misinformation due to a higher average climate susceptibility (Larzabal-Fernandez et al., 2025; Sultan et al., 2024).

When it comes to other stable characteristics, some explanations for why people fall prey to misinformation point to specific *personality traits*. The Big Five model is the most widely accepted model for personality traits, comprising the five factors of openness to experience, conscientiousness, extraversion, agreeableness, and neuroticism (John et al., 2012; Johnson, 2017). Openness to experience is the willingness to engage with new things and think outside the box. Conscientiousness is the tendency to be organized and plan carefully. Extraversion is the tendency to draw energy from social interactions and is characterized by sociability and assertiveness. Agreeableness is the tendency to be cooperative and considerate in interpersonal relationships. Neuroticism is characterized by emotional instability and a tendency toward negative emotions such as anxiety and stress. A review by Calvillo et al. (2024) found modest correlations between personality traits and a tendency for believing and sharing misinformation: Believing and sharing misinformation was associated with higher extraversion, lower conscientiousness and lower agreeableness, while higher neuroticism was associated with sharing misinformation. While ideology may primarily explain the motivation for believing and sharing misinformation, personality traits may better explain how people approach information in general.

3. Current Study

Building on the outlined theoretical framework, our present study aims to investigate the individual-level drivers of credibility judgments about climate

change information. We focus on manipulative strategies as a measurable component of misinformation (similar to Cook et al., 2023). Specifically, we examine the ability to identify manipulative and credible content (manipulation discernment) and the willingness to share credible over manipulative content (sharing discernment). While analytic thinking is a known predictor of discernment, less is known about the individual factors that promote an analytical mindset. Therefore, we also examine analytic thinking as an outcome. We will assess the predictive power of several individual characteristics including demographic variables (age, gender, educational background), cognitive and belief-system factors (conspiracy thinking, persuasion knowledge, political opinion and prior content knowledge) and stable personality traits (the Big Five). We report discernment for clarity, but our formal hypotheses are tested by including an interaction on the trustworthiness of the content being evaluated (manipulative vs. credible).

Our investigation is guided by the following research questions:

Research Question 1: To what extent do demographic, cognitive, and belief-system factors predict participants' a) manipulation discernment, b) sharing discernment, and c) analytic thinking?

This question addresses the combined influence of our selected predictors on credibility assessment, sharing intention and analytic thinking. Given mixed findings on demographics, we expect that age will be positively associated with general skepticism but do not expect gender or education to be credible predictors of manipulation and sharing (Sultan et al., 2024). In line with robust evidence, we expect that higher conspiracy beliefs and lower analytic thinking will be associated with lower manipulation and sharing discernment (O'Mahony et al., 2023; Pennycook & Rand, 2019). Based on initial findings by Fendt et al. (2025), we expect that higher persuasion knowledge will be associated with better manipulation and sharing discernment. Finally, because climate change is a highly politicized topic where worldviews can supersede factual knowledge (Edelson et al., 2024; Flanagin et al., 2020; Swire-Thompson et al., 2020), we expect that more conservative political opinion will be associated with lower manipulation and sharing discernment, but that there will be no credible effect of content knowledge.

Research Question 2: What is the predictive power of the Big Five personality traits to explain a) manipulation discernment, b) sharing discernment, and c) analytic thinking?

While Research Question 1 (RQ1) primarily examines demographic, cognitive, and belief factors, this question focuses on the role of stable dispositional

traits via the Big Five. Based on prior research (Calvillo et al., 2024), we expect that lower conscientiousness, indicating less thoroughness and lower agreeableness, indicating higher antagonism, will predict worse manipulation and sharing discernment.

Research Question 3: What is the predictive power of the time spent evaluating information to explain a) manipulation discernment, b) sharing discernment, and c) analytic thinking?

Drawing from dual-process theories that contrast fast, intuitive thinking with slow, deliberate thinking (Pennycook & Rand, 2019), we use the time participants spend on each judgment as a behavioral proxy for cognitive deliberation. This aligns with recent studies suggesting that misinformation susceptibility may be related to a failure to engage with information analytically (Bago et al., 2020). We therefore expect that individuals who spend more time evaluating information will better identify manipulative content and less likely share it.

To answer these questions, our study presented participants with eight synthetic social media posts. These posts either contained one of five manipulative strategies (false dichotomies, ad hominem attacks, cherry-picking data, setting impossible expectations, and pseudo-experts) or were presented as a non-manipulative control version. We calculate two of our primary outcomes, manipulation and sharing discernment, using scores of participants' ratings for manipulative and non-manipulative (control) social media posts (similar to Roozenbeek et al., 2022). The third outcome, analytic thinking, is operationalized as a sum of participants' self-reports of analytically assessing each stimulus. Our predictors for research question 1 are age, gender, conspiracy thinking (Uscinski et al., 2017), persuasion knowledge (Fendt, Scheibenzuber, et al., 2025), political opinion, and content knowledge (Visschers, 2018). To answer research question 2, we use the Big Five personality traits (Rammstedt et al., 2017) which were measured in only a subsample of $n = 224$ participants due to data loss. To answer research question 3, we will use the task time on each stimulus as the predictor variable, serving as a behavioral proxy of cognitive reflection. We will analyze the data in R using a multivariate Bayesian linear regression model for each research question.

4. Methods

This study employed a cross-sectional design to investigate the factors related to discerning and sharing online information. This study was approved by the university's ethics committee prior to data collection and preregistered as part of a larger project. All participants gave informed consent. Supplementary materials including analysis script and dataset are available on osf.io/rt6p8/.[4]

4.1 Participants

We collected 697 complete responses in a science museum in Southern Germany. We asked participants at the end of the study whether they had answered every question honestly and carefully, assuring them this would not result in any penalty, and excluded those who stated they had not ($n = 22$). This resulted in a final sample of $N = 675$ participants, spanning a wide age range from 9 to 80 years ($M = 33.67$, $SD = 15.51$). Gender distribution was balanced (53% male, 45% female, 1% non-binary). Most of the participants were involved in higher education (18% lower secondary education degree, 18% A-levels, 48% university degree, 7% PhD). Our sample size allowed us to detect a smallest predictor effect of $\beta = .03$ with either $BF > 5$ or $BF < 0.5$ with above 90% power. Due to unforeseen data loss, only 224 participants provided Big Five personality covariates. This subsample allowed us to detect a smallest predictor effect of $\beta = .10$ with either $BF > 5$ or $BF < 0.5$ with above 90% power.

4.2 Measures

Dependent variables are manipulation discernment, sharing discernment, and analytic thinking. Predictors are age, gender, political opinion, conspiracy thinking, persuasion knowledge, content knowledge, the Big Five personality traits, and trustworthiness. We report the raw scores for descriptive statistics but use the z-standardized scores in our analyses for easier interpretation.

Manipulation. Participants' ability to discern manipulative intent was assessed by randomly showing them 8 stimuli in a version that randomly either did or did not contain a manipulative strategy. Participants rated each post on a 7-point Likert scale from 1 = absolutely not manipulative to 7 = absolutely manipulative. We then summed the ratings on control items to a control score

4 Retrieved November 1, 2025.

and the reverse coded ratings of manipulative items to a misinformation score. That means, rating a manipulative item with a '7' (absolutely manipulative) contributed to a higher *misinformation score*, while rating a control item with a '1' (absolutely not manipulative) contributed to a higher *control score*. *Discernment* ($M = 0.98$, $SD = 1.64$) was calculated as the sum of the manipulative and the control score. A higher discernment score indicates a tendency to correctly judge whether information is manipulative or not (Roozenbeek et al., 2022). Our formal inferential test of discernment is modeled via an interaction term, as detailed in the Analysis section.

Sharing. Participants indicated for each post how likely they would share it (1 = absolutely not to 7 = absolutely). Ratings for misinformation and control posts were summed separately. *Discernment* ($M = 0.87$, $SD = 1.35$) was again calculated as the sum of the manipulative and the control score. That means, higher discernment indicates a tendency to share more trustworthy posts instead of manipulative ones. Again, our primary analysis tests this effect using an interaction term in the regression model.

Analytic thinking. Participants indicated for each post whether they had judged it intuitively (= 0) or analytically (= 1). The answers were then summed ($M = 5.31$, $SD = 2.11$), with higher scores indicating more analytic verdicts and lower scores indicating more intuitive judgments.

Predictor variables. We measured age, gender (female, male, non-binary), political opinion, conspiracy thinking, content knowledge, the Big Five personality traits, and trustworthiness as covariates. We measured *political opinion* ($M = 3.49$, $SD = 1.29$) with a single item on a 7-point Likert scale (1 = very progressive to 7 = very conservative). We assessed participants' *climate knowledge* ($M = 15.91$, $SD = 2.63$, $\omega = .74$), on a 4-item scale by Visschers (2018) with 5-point Likert responses (1 = totally disagree, 5 = totally agree). We measured *conspiracy thinking* on a 4-item scale by Uscinski et al. (2017) with 5-point Likert responses (1 = totally agree, 5 = totally disagree) that were then summed ($M = 14.48$, $SD = 3.81$, $\omega = .84$). We measured *persuasion knowledge*, which we conceptualize as participants' knowledge of persuasive attempts by misinformation creators, on a short scale derived from Fendt et al. (2025) with 5 items on a 7-point Likert scale (1 = totally disagree, 7 = totally agree), which were then scored ($M = 25.25$, $SD = 6.05$, $\omega = .85$).

We recorded the *time* ($M = 15.07$, $SD = 16.51$) participants took to answer for each post, which we logarithmized due to a right-skew (4.45).

We included the *Big Five personality traits* using the 10-item scale by Rammstedt et al. (2017) with 2 items on a 5-point Likert scale, each for openness

($M = 4.72$, $SD = 1.97$, $\omega = .68$), conscientiousness ($M = 7.17$, $SD = 1.54$, $\omega = .40$), extraversion ($M = 6.33$, $SD = 1.70$, $\omega = .64$), agreeableness ($M = 5.90$, $SD = 1.57$, $\omega = .39$), and neuroticism ($M = 5.51$, $SD = 1.80$, $\omega = .64$).

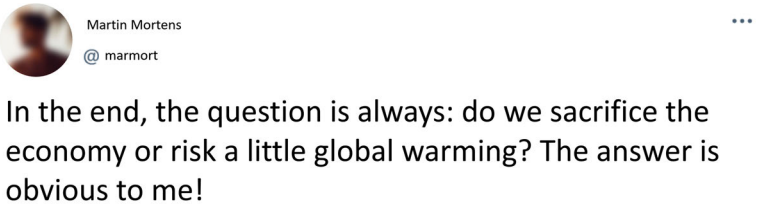
4.3 Materials and Procedure

We administered the study via Qualtrics. Participants were recruited face-to-face by the researchers in a science museum in Southern Germany and participated voluntarily. After providing informed consent, participants provided demographic information. Then, participants saw 8 stimuli that were designed to look like social media posts (following the principles of Cook et al., 2023; Roozenbeek et al., 2022).

These posts (see Figure 1) either contained or did not contain one of five manipulative strategies: false dichotomies, ad hominem attacks, cherry-picking data, setting impossible expectations, and presenting pseudo-experts as credible sources.

- *False dichotomies* imply that only two options exist, often diametrically opposed, with one depicted as undesirable (e.g., "Either we save the climate or our hardworking citizens will lose their jobs and starve").
- *Ad hominem attacks* unfairly target an opponent's credibility instead of their argument, often implying hypocrisy (e.g., "You can't believe such a ridiculous-looking person").
- *Cherry-picking data* involves selecting only supportive cases, often favoring anecdotal evidence over statistics (e.g., "Climate change can't be that bad because there was still snow in the alps last winter").
- *Impossible expectations* set unattainable standards for proof (e.g., "I only believe in climate change, if 100% of the experts agree").
- *Pseudo-experts* are individuals with expertise in unrelated fields who use their academic titles to spread misinformation (e.g., someone with a PhD in computer science pretending to be a scientific expert in climate change).

Figure 1: Sample post containing a false dichotomy.



Note. The false dichotomy can be identified by only presenting two viable options (economy vs. climate). This technique is often accompanied by steering the audience towards the desired option (i.e., risk a little global warming).

These synthetic social media posts were randomly drawn from a pool of stimuli in a planned missing-data design following this procedure:

1) Each participant randomly saw stimuli related to two out of five manipulation strategies (false dichotomies, ad hominem arguments, cherry-picking, impossible expectations, pseudo-experts).
2) For each strategy, four out of six possible stimuli were randomly selected.
3) Each of these four posts was then randomly shown in a version that contained a manipulation strategy or the non-manipulative control version.

For each of the eight posts presented, participants indicated their manipulation rating, sharing intention, and analytic thinking. After seeing the stimuli, participants provided data for the covariates and feedback before they were debriefed.

To illustrate the randomization, we outline a hypothetical participant Adam. The randomizer selected that Adam receives posts that may contain false dichotomies or cherry-picking. The randomizer selected the cherry-picking posts 1, 3, 4, and 6. Adam receives post 1 in the misinformation version, which says: "If global warming really exists, why was last winter colder than the previous one?". He rates the credibility of the post as absolutely not credible (1) and would never share such a post (7) based on his gut feeling (0). He would then receive the post 4 in a control version that says: "Ralf says he works a lot. I still think short breaks are important to stay as productive as possible". Adam is fairly sure that this post does not contain a manipulative strategy (2) and would therefore potentially also share it (3), but still analytically thinkings whether the post contains a manipulative strategy (1). After

filling out the cherry-picking posts, Adam fills out four posts that may contain false dichotomies to finally provide covariates and feedback. Since Adam said to have answered carefully and in good faith, we include his response in our analysis.

4.4 Analysis

All statistical analyses were conducted in R 4.5 using the brms 2.23 package. After scoring the individual scales, we z-standardized all continuous predictors and dependent variables prior to analysis, implying that the parameter estimates can be interpreted as effect sizes. We estimated a multivariate regression model for each research question using Bayesian statistics, which provides advantages in model estimation, but features parameters that can be interpreted like those in frequentist models (Edelsbrunner et al., 2024).

For research question 1, we estimated a multivariate multilevel regression model in which the dependent variables were the scores on credible and manipulative stimuli (manipulation, sharing, and analytic thinking), nested within participants. The multilevel structure allowed us to include scores akin to discernment as well as an interaction between trustworthiness and the predictors to assess whether judgment on credible and dubious stimuli might differ. The predictors were age, gender, political opinion, conspiracy thinking, persuasion knowledge, and content knowledge as well as their interaction with trustworthiness.

For research question 2, due to a misconfiguration of the platform the first two thirds of our participants did not see the Big Five covariates. Since imputing such a large percentage of missing variables would have greatly reduced the meaningfulness of the predictor estimates, we estimated a separate model for this partial sample (n = 224) that included the Big Five covariates but was otherwise identical to the previous one. We compared the demographics and performance of the subsample with our other participants to find no credible differences.

For research question 3, we estimated a model in which the ratings of individual posts (manipulation, sharing, and analytic thinking) were the dependent variables, nested for each participant. The predictors were the logarithmized task time and its interaction with trustworthiness.

For *model estimation*, we used four chains with 5,000 draws each (1,000 of which were treated as burn-in). We specified weakly informative priors, which are Student t-distributions with 3 degrees of freedom, locations of 0, and scales

of 10 for variance parameters. All models converged without issues, indicated by $\hat{R} = 1.00$ for all parameters, no divergent transitions during estimation and visual inspection of posteriors (which were all strongly unimodal), and mixing in posterior trace plots.

Regarding *model interpretation*, we assessed overall model fit with a Bayesian R^2, which can be interpreted like the frequentist equivalent (R^2_{adj}). We interpret the medians of posterior distributions as parameter estimates. Because Bayesian models do not rely on *p* values, we instead examined highest density intervals, representing the range of parameter values covering the central 90% of the posterior (90% HDIs). If the 90% HDI does not include 0.00, we interpret this as evidence that the effect deviates from zero (Sorensen et al., 2016). While there is no scientific consensus on the range for reporting HDIs yet, we decided to use 90% intervals because recent research increasingly favors these intervals and they are also more reliable than 95% intervals (Edelsbrunner et al., 2024; McElreath, 2018).

5. Results

The **main model** (RQ1) for predictors of manipulation discernment ($R^2 = .226$), sharing discernment ($R^2 = .543$), and analytic thinking ($R^2 = .053$) explained a moderate amount of variance (see Table 1). Manipulation and sharing discernment correlated weakly, $r = .19$, $SE = .03$, manipulation discernment and analytic thinking, $r = .03$, $SE = .02$, as well as sharing discernment and analytic thinking, $r = .06$, $SE = .03$, shared no meaningful correlation.

Several individual characteristics were associated with better overall performance on *manipulation discernment*. Participants were better at identifying manipulative content than credible content, $\beta = -.99$. A more progressive political opinion, $\beta = -.08$, higher conspiracy thinking, $\beta = .09$, higher climate knowledge, $\beta = .12$, higher persuasion knowledge, $\beta = .08$, and higher formal education, $\beta = .05$, were associated with better manipulation discernment.

Higher *sharing discernment* was associated with a more progressive political opinion, $\beta = -.07$, higher conspiratory thinking, $\beta = .14$, more climate knowledge, $\beta = .05$, and more persuasion knowledge, $\beta = .07$.

More *analytic thinking* was associated with a more progressive political opinion, $\beta = -.05$, more climate knowledge, $\beta = .10$, more persuasion knowledge, $\beta = .08$, and higher formal education, $\beta = .03$.

We found several *interaction* effects. For manipulation discernment, there was an interaction between trustworthiness and climate knowledge, $\beta = -.11$, indicating that people with more climate knowledge were better at judging credible content than manipulative content. For sharing discernment, higher conspiracy thinking interacted with trustworthiness, $\beta = .11$, suggesting those high in conspiracism were better at making sharing decisions for manipulative content than for credible content. The interaction with climate knowledge was negative, $\beta = -0.24$, indicating that those with more knowledge were particularly better at making appropriate sharing decisions for credible content.

Table 1: Regression results of the main model.

	Manipulation			Sharing			Analytic Thinking		
Parameter	β	**SE**	**HDI**	β	**SE**	**HDI**	β	SE	HDI
Intercept	.61	.13	**[.40; .81]**	.79	.10	**[.63; .95]**	-.12	.14	[-.35; .11]
Trustworthiness	-.99	.14	**[-1.22; -.75]**	-1.79	.11	**[-1.97; -1.61]**	-.09	.16	[-.35; .17]
Political Opinion	-.08	.03	**[-.13; -.04]**	-.07	.02	**[-.10; -.03]**	-.05	.03	**[-.10; .00]**
Conspiracy Thinking	.09	.04	**[.03; .15]**	.14	.03	**[.09; .18]**	.02	.04	[-.05; .08]
Climate Knowledge	.12	.04	**[.06; .18]**	.05	.03	**[.01; .10]**	.10	.04	**[.04; .17]**
Persuasion Knowledge	.08	.04	**[.02; .14]**	.07	.03	**[.02; .11]**	.08	.04	**[.01; .14]**
Gender	.03	.05	[-.05; .10]	.01	.04	[-.04; .08]	-.02	.05	[-.10; .07]
Age	.00	.00	[-.01; -.00]	.00	.00	[.00; .01]	.00	.00	[.00; .01]
Education	.05	.02	**[.02; .07]**	.01	.01	[-.02; .03]	.03	.02	**[.01; .07]**
Trustworthiness * Political Opinion	.04	.04	[-.02; .10]	.11	.03	**[.06; .16]**	.01	.04	[-.05; .09]
Conspiracy Thinking	-.11	.05	**[-.20; -.02]**	-.24	.04	**[-.30; -.17]**	-.06	.06	[-.15; .03]
Climate Knowledge	-.08	.05	[-.17; .00]	-.03	.04	[-.10; .03]	-.04	.06	[-.13; .05]
Persuasion Knowledge	-.07	.05	[-.16; .01]	-.14	.04	**[-.21; -.08]**	.02	.06	[-.08; .11]
R^2	.226	.02		.543	.01		.053	.01	

Table 2: Regression results of the Big Five model.

	Manipulation			Sharing			Analytic Thinking		
Parameter	β	SE	HDI	β	SE	HDI	β	SE	HDI
Intercept	.77	.21	**[.43; 1.11]**	.85	.16	**[.59; 1.12]**	-.14	.26	[-.54; .29]
Trustworthiness	-1.02	.25	**[-1.45; -.64]**	-1.73	.19	**[-2.04; -1.42]**	.02	.30	[-.46; .51]
Political Opinion	-.08	.05	[-.16; .00]	-.04	.04	[-.10; .02]	-.10	.06	[-.19; .00]
Conspiracy Thinking	.08	.07	[-.03; .19]	.08	.05	**[.00; .17]**	-.07	.08	[-.20; .06]
Climate Knowledge	.14	.06	**[.05; .24]**	.06	.05	[-.02; .13]	.16	.07	**[.04; .28]**
Persuasion Knowledge	.04	.06	[-.06; .14]	.09	.05	**[.01; .16]**	.06	.07	[-.05; .18]
Gender	-.03	.08	[-.16; .10]	-.01	.06	[-.11; .09]	.01	.10	[-.15; .16]
Age	.00	.00	[-.01; .00]	.01	.00	[.00; .01]	.01	.00	[.00; .01]
Education	.05	.03	**[.00; .10]**	-.04	.02	**[-.07; -.00]**	.05	.03	[-.01; .10]
Openness	-.04	.06	[-.13; .05]	-.04	.04	[-.11; .03]	-.03	.07	[-.14; .08]
Conscientiousness	.04	.06	[-.05; .13]	.00	.04	[-.07; .07]	-.14	.07	**[-.26; -.04]**
Extraversion	-.05	.06	[-.15; .04]	-.02	.04	[-.10; .05]	.03	.07	[-.09; .15]
Agreeableness	.02	.06	[-.07; .11]	-.10	.04	**[-.17; -.02]**	.05	.07	[-.06; .16]

	Manipulation			Sharing			Analytic Thinking		
Neuroticism	-.04	.06	[-.14; .06]	-.01	.05	[-.09; .06]	.01	.07	[-.11; .13]
Trustworthiness * Political Opinion	.03	.07	[-.08; .15]	.05	.05	[-.03; .14]	.00	.08	[-.14; .13]
Conspiracy Thinking	-.19	.09	**[-.34; -.04]**	-.21	.07	**[-.33; -.10]**	-.01	.11	[-.18; .18]
Climate Knowledge	-.11	.08	[-.25; .02]	-.05	.06	[-.16; .05]	-.17	.10	**[-.34; -.01]**
Persuasion Knowledge	.04	.08	[-.09; .18]	-.06	.06	[-.17; .04]	-.06	.10	[-.23; .10]
Openness	.08	.08	[-.05; .21]	.18	.06	**[.08; .28]**	.01	.10	[-.14; .17]
Conscientiousness	-.17	.08	**[-.29; -.04]**	-.07	.06	[-.16; .03]	.28	.09	**[.12; .43]**
Extraversion	.05	.08	[-.09; .18]	.08	.06	[-.02; .19]	.00	.10	[-.17; .16]
Agreeableness	-.10	.08	[-.23; .03]	.18	.06	**[.08; .28]**	.02	.10	[-.14; .18]
Neuroticism	.02	.08	[-.12; .16]	.05	.06	[-.05; .15]	.08	.10	[-.09; .25]
R^2	.336	.03		.658	.02		.140	.03	

The **response time model** (R^2 = .069) indicated a small association between longer response time and worse sharing decisions, β = -.04, 90% HDI [-.07, -.01] and more analytic thinking, β = .23, 90% HDI [.17, .29], but not manipulation discernment, β = -.02, 90% HDI [-.04, .01].

In the **Big Five model** with our subsample (see Table 2), we observed several effects. For manipulation discernment, there was a negative interaction between trustworthiness and conscientiousness, β = -.17. Higher sharing discernment was associated with lower agreeableness, β = -.10. There were *interactions* with trustworthiness for openness, β = .18, and agreeableness, β = .18, indicating that more agreeable and open participants were better at identifying reliable information than misinformation. Furthermore, lower conscientiousness was associated with more analytic thinking, β = -.14, and interacted with trustworthiness, β = .28.

6. Discussion

In our information-driven world, the ability to critically evaluate information and make responsible sharing decisions is essential to reduce susceptibility to and the spread of misinformation. After decades of research, many predictors have been assessed to form a notable research body (e.g. Calvillo et al., 2024; Ecker et al., 2022; Sultan et al., 2024). However, open questions about the interplay of beliefs, stable individual characteristics demographics and their influence on judging and sharing information remain.

This study sought to address these questions by assessing how cognitive abilities, belief systems, and personality traits predicted participants' ability to discern manipulative content, their intention to share it, and their use of analytic thinking. Overall, we found three key patterns. First, in line with recent research, participants were generally skeptical of manipulative content and often identified it more readily than credible content (similar to Modirrousta-Galian et al., 2025). Second, belief systems, particularly political orientation, and conspiracy thinking, were powerful predictors, often in complex and interactive ways. Third, less agreeable participants made more accurate sharing decisions, while more conscientious participants reported judging information more intuitively. Constantly, taking more time to scrutinize information yielded slightly better average results.

6.1 The Influence of Beliefs and Demographics

Our first research question sought to identify the strongest predictors of manipulation discernment, sharing discernment and analytic thinking. When it comes to demographics, we observed negligible gender and age effects. While

the meta-analysis by Sultan et al. (2024) suggested that older individuals may exhibit greater general skepticism toward all information, we did not find such a tendency in our study. This may indicate that effects driven by social identity and beliefs can overshadow age-related skepticism, especially on highly polarized and domain-specific topics like climate change. However, higher formal education predicted better manipulation discernment and analytic thinking, suggesting that formal education could be a protective factor against climate misinformation. This may be because formal education teaches the mechanisms behind climate change which could result in a deeper understanding of the issue.

When it comes to beliefs, *political opinion* played a role in predicting performance. More politically progressive participants showed better manipulation discernment, made better sharing decisions and approached information more analytically. In line with meta-analytic findings, our participants' credibility assessment may have been partially motivated by their worldview as climate change is a topic where scientific consensus aligns more closely with a progressive mindset (Pfänder & Altay, 2025). This explanation is further supported by the finding that progressive participants reported engaging more analytically with the posts. While the relationship between analytic thinking and better credibility discernment is well-researched (e.g. Faragó et al., 2023; Swami et al., 2014), this could indicate that progressive participants were simply more motivated to engage with posts on such topic analytically.

However, conservative participants detected misinformation better than credible information. This does not necessarily mean conservatives spot falsehoods better overall, but rather that their performance on the two types of content was different (in line with Sultan et al., 2024). This may indicate that conservative participants were reluctant to share information on climate change in general, but this aversion was strongest for content that appears manipulative (Benegal & Scruggs, 2018).

Counterintuitively, *conspiracy thinking* was associated with better discernment. However, the interaction with trustworthiness suggests a more complex situation: While individuals low in conspiracy thinking distinguished between sharing credible and manipulative content, this effect diminishes for those with a more conspiratorial mindset. This supports theories that frame conspiracies as a self-sealing system of epistemic distrust (Imhoff & Bertlich, 2024; Lewandowsky et al., 2013). We interpret the higher average discernment score not as pro-social accuracy, but as an artifact of broad-spectrum distrust:

Participants with a conspiratorial mindset were reluctant to share and believe any posts.

In line with our expectations, *climate knowledge* predicted more meaningful sharing decisions and better manipulation discernment, while participants also approached information more analytically. This may align with aforementioned effect of ideological congruency, since climate knowledge is a highly polarized topic. Furthermore, this effect seemed to be weaker for identifying dubious information. Knowledge alone may therefore not suffice to withstand manipulation in general, which again raises the need for complementary support to meaningfully scrutinize information (Breakstone et al., 2021; Sultan et al., 2024).

Similarly, higher *persuasion knowledge* was linked to more analytic thinking, more meaningful sharing decisions, and better manipulation discernment. This is in line with the findings of Fendt et al. (2025), who also found a straightforwardly positive role for persuasion knowledge. This does not come as a surprise, since persuasion knowledge also indicates skeptical awareness towards persuaders (Eisend & Tarrahi, 2022). In other words, participants who had already been skeptical towards misinformation outlets better recognized and withstood their persuasion attempts. However, the negative interaction for sharing discernment suggests that while knowledge of persuasive tactics helps to correctly evaluate credible posts, it appears less effective when deciding whether to share manipulative content.

Beyond the predictors for each outcome, we found that believing and sharing information was only weakly connected in our sample. This suggests that accurately judging information as manipulative does not automatically translate into a reluctance to share it and vice-versa. First, in line with Baribi-Bartov et al. (2024), many people may be "few-sharers" who rather err on the side of caution. Our sample may therefore have already been rather careful about their decisions. Second, individual may not feel the need to share such information if they grew up with a deep believe that anthropogenic climate change is common knowledge—as much as they wouldn't share a post outlining that the earth is not flat. Third, sharing motives are complex and not always driven by accuracy; people may ironically share information they know is false to ridicule it or warn peers.

6.2 Big Five Personality Traits

Our second research question focused on the role of the *Big Five personality traits*. We found only a credible association between higher agreeableness and lower sharing discernment. This is consistent with Calvillo et al (2024), who also identified mostly inconsistent correlations and may suggest that personality traits are less influential drivers than belief systems. While paradoxical at first, this effect may indicate a particular skepticism towards dubious information, since more agreeable participants detected credible information better than misinformation. This aligns with the core idea that agreeable individuals are motivated by trust, compassion, and harmony (Reizer et al., 2023), rather than distrust and suspicion, the former being potentially more useful drivers in our society (Altay et al., 2023).

The positive interaction effect for openness on sharing discernment aligns well with theory, suggesting that open-minded individuals shared credible information more than dubious content. Unexpectedly, lower conscientiousness was associated with more self-reported analytic thinking. We can only speculate on the reasons for that finding, but maybe analytic thought is the "modus operandi" for more conscientious people, whereas for less conscientious people deliberate thought is a notable event that they actively remember and report. However, the reliability of our agreeableness and conscientiousness subscales was low, which calls for caution in interpreting these results.

6.3 The Role of Deliberation Time

Our third question examined task time as a behavioral proxy for deliberation. Counterintuitively, we found no meaningful association between deliberation time and manipulation discernment and a negative association with sharing discernment. This finding does not seem to align with previous research supporting the idea that misinformation susceptibility may often be a failure of deliberation, where individuals rely on their fast, intuitive gut reactions rather than more effortful analytical thought (Faragó et al., 2023; Pennycook & Rand, 2019). However, longer deliberation time was still associated with more analytic thinking.

Analytic thinking may have been triggered by motivated reasoning, where people investigate analytically only when information contradicts their beliefs (similar to Kahan et al., 2012). In that case, participants may not have used analytical thought for accuracy-focused evaluation but to justify their pre-exist-

ing positions—a rationalization that participants would have experienced as analytic thought. In line with our previous arguments, participants' cognitive effort may have been hijacked to serve ideological goals on a polarized topic such as climate change.

6.4 Implications for Research and Practice

While our study was mainly exploratory, the results contribute to misinformation research in several ways. First, they provide another datapoint against purely information-deficit models, especially in the context of politically polarized topics, supporting motivated reasoning as one central driver for beliefs in this domain (Swire-Thompson et al., 2020). This may suggest that practitioners, for example at schools, should consider the social environment and beliefs of learners to incorporate more holistic approaches that include character development in long-term curricula rather than a sole content-focus.

Second, we found that participants identified misinformation more accurately than credible information, strengthening the argument that these might be two distinct processes. Future research should investigate the specific cognitive processes required to identify different types of information. This could especially inform the design of meaningful interventions that do not foster general skepticism but also increase trust in established institutions and credible information (similar to Altay et al., 2024). Persuasion knowledge remains a plausible influence on detecting certain manipulation strategies, but its measurement may need to be more specific to the manipulation tactics being deployed.

Third, our results demonstrate that there appears to be no single strong predictor of recognizing manipulation. Instead, we found a constellation of small effects involving climate knowledge, persuasion knowledge, and political opinion. This complexity may underscore the need for multifaceted approaches to explain and combat misinformation susceptibility.

6.5 Limitations and Future Directions

This exploratory study, while carefully prepared and conducted, has several limitations. First and foremost, we found only small effects for our predictors, which may indicate that we overlooked crucial variables, such as social media behavior or media literacy. Furthermore, we assessed political opinion on a

one-item scale, whereas recent discussions shift towards a multi-dimensional assessment.

Our data was collected from visitors at a science museum, resulting in a highly educated sample that limits the generalizability of our findings. Furthermore, the museum setting may have primed participants to be more analytical or, conversely, caused cognitive fatigue after a day of learning.

We experienced substantial data loss for the Big Five personality traits, limiting the predictive quality of these results. Also, the reliability of the conscientiousness and agreeableness subscales was very low. Additionally, our synthetic stimuli may not have captured the complexity and emotional resonance of real-world misinformation as they were lacking most of the surrounding information, such as the author. Future studies may want to recreate more authentic environments like clickable mock social media pages.

Finally, the cross-sectional nature of our data does not allow for causal claims. For example, we cannot determine whether a conspiratorial worldview causes a particular sharing style or if that style is merely one component of a broader conspiratorial identity. Future research should employ experimental designs, for example, by training participants to direct skepticism towards suspicious actors rather than all information.

7. Conclusion

Our study contributes to a deeper understanding of the factors driving judgments about climate misinformation. The findings support the conclusion that a person's political identity and belief systems are as powerful as their objective knowledge in predicting their judgments. Interventions aimed at mitigating the spread of misinformation should address the complex interplay of identity, ideology, and the social motivations that govern our behavior online.

CRediT Statement

Marvin Fendt: Conceptualization, Methodology, Data curation, Formal analysis, Investigation, Writing—original draft, Writing—Review & Editing. **Fabian Reinwarth**: Investigation; Writing—original draft. **Peter Adriaan Edelsbrunner**: Conceptualization, Methodology, Writing—original draft, Writing—Review & Editing, Supervision.

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